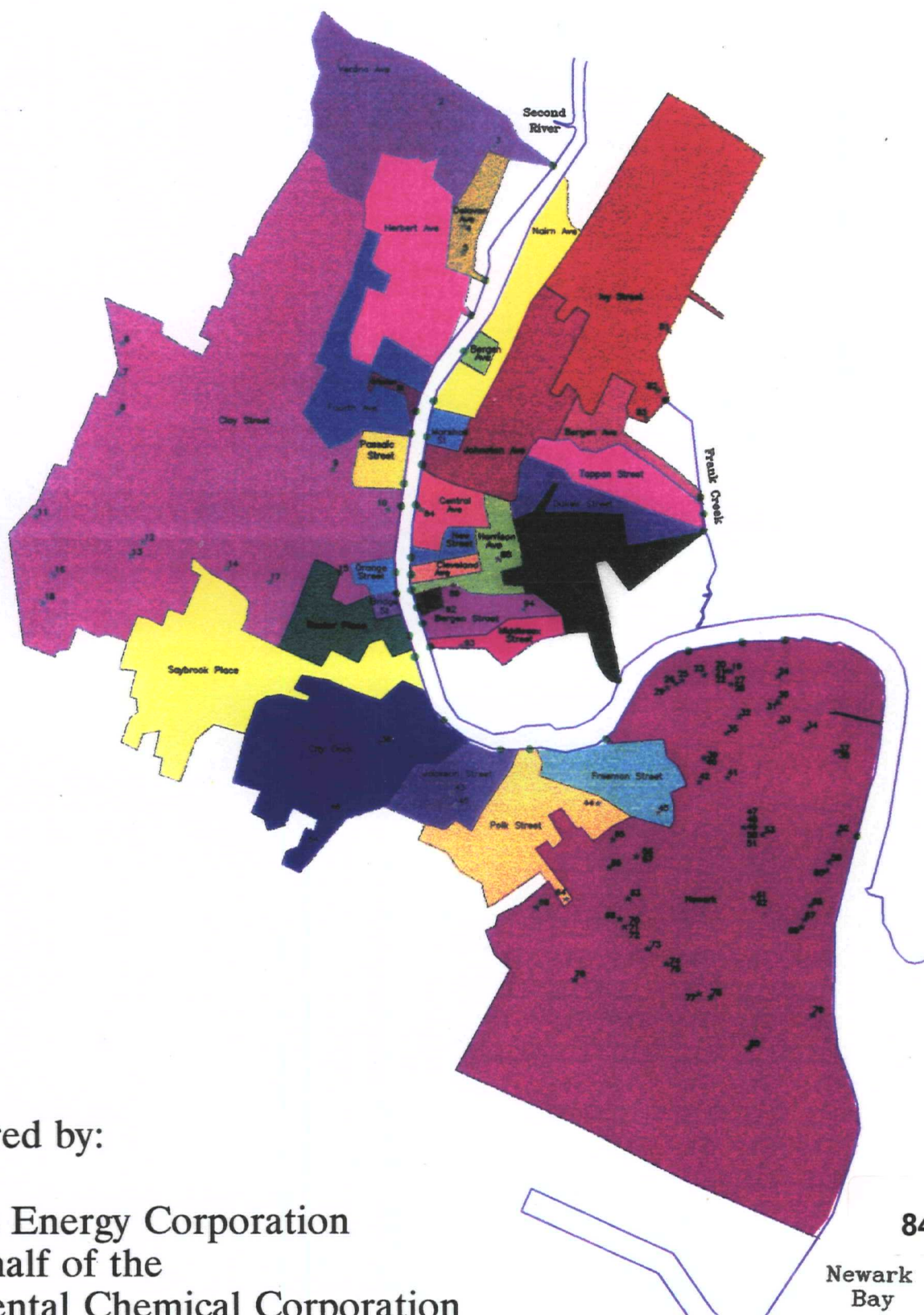




REPORT ON INDUSTRIAL WASTE STREAMS BYPASSED TO THE PASSAIC RIVER



Prepared by:

Maxus Energy Corporation
on behalf of the
Occidental Chemical Corporation

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**REPORT ON
INDUSTRIAL WASTE STREAMS
BYPASSED
TO THE PASSAIC RIVER**

**SOURCES OF HAZARDOUS SUBSTANCES
IN THE SIX MILE STUDY AREA**

**EPA Region II
August 1994**

Prepared by:

**Maxus Energy Corporation
on behalf of the
Occidental Chemical Corporation**

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PART I INTRODUCTION

This Report outlines facts and conclusions concerning the systematic discharge, called "bypassing," of untreated effluent, including industrial waste streams, to the Six Mile Study Area of the Passaic River.¹ The facts described in this Report bear materially on many issues concerning the Six Mile Study Area, including the number and identification of potentially responsible parties ("PRPs") for costs associated with the Six Mile Study Area under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601, *et seq.* ("CERCLA"). This Report has been prepared for the Maxus Energy Corporation ("Maxus") which is implementing the Administrative Order on Consent ("AOC") concerning the Six Mile Study Area on behalf of Occidental Chemical Corporation, the successor to the Diamond Shamrock Chemicals Company. Pursuant to CERCLA § 113(k), 42 U.S.C. § 9613(k), and EPA's implementing regulations, 40 C.F.R. §§ 300.800-.882, Maxus designates this Report for inclusion in the administrative record for the Diamond Alkali Superfund Site.

This Report is divided into six Parts. Part I introduces the Report. Part II summarizes the Report's conclusions. Part III describes the past and present bypassing practice. Part IV discusses some of the evidence concerning the nature of the effluent bypassed. Part V demonstrates, by examples, how this practice establishes the CERCLA liability of industrial PRPs within the Passaic Valley Sewerage Commission's ("PVSC") service area. Part VI suggests appropriate follow-up action.

This Report is accompanied by a separately bound Appendix of exhibits. The Appendix includes a copy of the affidavit of Seymour Lubetkin, the former Chief Engineer for the PVSC, and supporting documentation for each of the three examples discussed in Part V of the Report. We also submit with this Report a copy of the first volume of the PVSC's *Report Upon Overflow Analysis* (Killam 1976) ("Overflow Report").

¹ The Study Area is defined as those reaches of the Passaic River from the abandoned ConRail Railroad bridge at the downriver Study Area extent located at the USACE station designation of 40+00 (i.e., a transect running perpendicular to the USACE Federal Project Limit for dredging 4000 feet upstream from the red channel junction marker at the confluence of the Hackensack and Passaic Rivers) to a transect six miles (31,680 feet) upriver located at the USACE station designation of 356+80.

PART II SUMMARY OF CONCLUSIONS

This Report explains that:

- Untreated effluent has routinely been discharged or "bypassed" to the Passaic River through more than thirty-five outfalls within the Six Mile Study Area.
- The bypassing practice began in 1924 and continues to the present day.
- Some portion of the waste stream of every industrial discharger within the PVSC service area has been bypassed untreated to the River, whether or not the industrial discharger has maintained direct outfalls to the River.
- The systematic bypassing included PCDDs, PCDFs, PCB, metals, and other hazardous substances now found in the Six Mile Study Area sediments.

As a result of the bypassing practice:

- Every industrial facility whose waste contained hazardous substances and whose waste has been bypassed to the Six Mile Study Area is a PRP. Collectively, these facilities are responsible for PCDDs, PCDFs, PCBs, pesticides, metals and other hazardous substances found in the Six Mile Study Area sediments.
- A *prima facie* liability case against many of these PRPs can be established from public records.

PART III LARGE QUANTITIES OF UNTREATED EFFLUENT HAVE ROUTINELY BEEN DISCHARGED TO THE PASSAIC RIVER

A. Overview of Bypassing Practice

Before 1924, each of the municipalities in the PVSC service area maintained sewer systems that funnelled all the collected untreated waste through outfalls directly into the River. (Lubetkin Aff. at ¶ 7) The deepest sediments in the Study Area reflect significant levels of contamination consistent with this historical discharge practice.²

In 1907, the New Jersey Legislature prohibited the discharge of noxious or polluting matter to the Passaic River, between Great Falls and the mouth of the River. The Legislature also gave the PVSC the authority to negotiate contracts with any two or more municipalities in the district for the construction, operation, and maintenance of a sewage collection and treatment system. The PVSC opened its sewage collection, treatment and disposal system in 1924. By 1975, this system served thirty municipalities, including Newark, Harrison and Kearny.

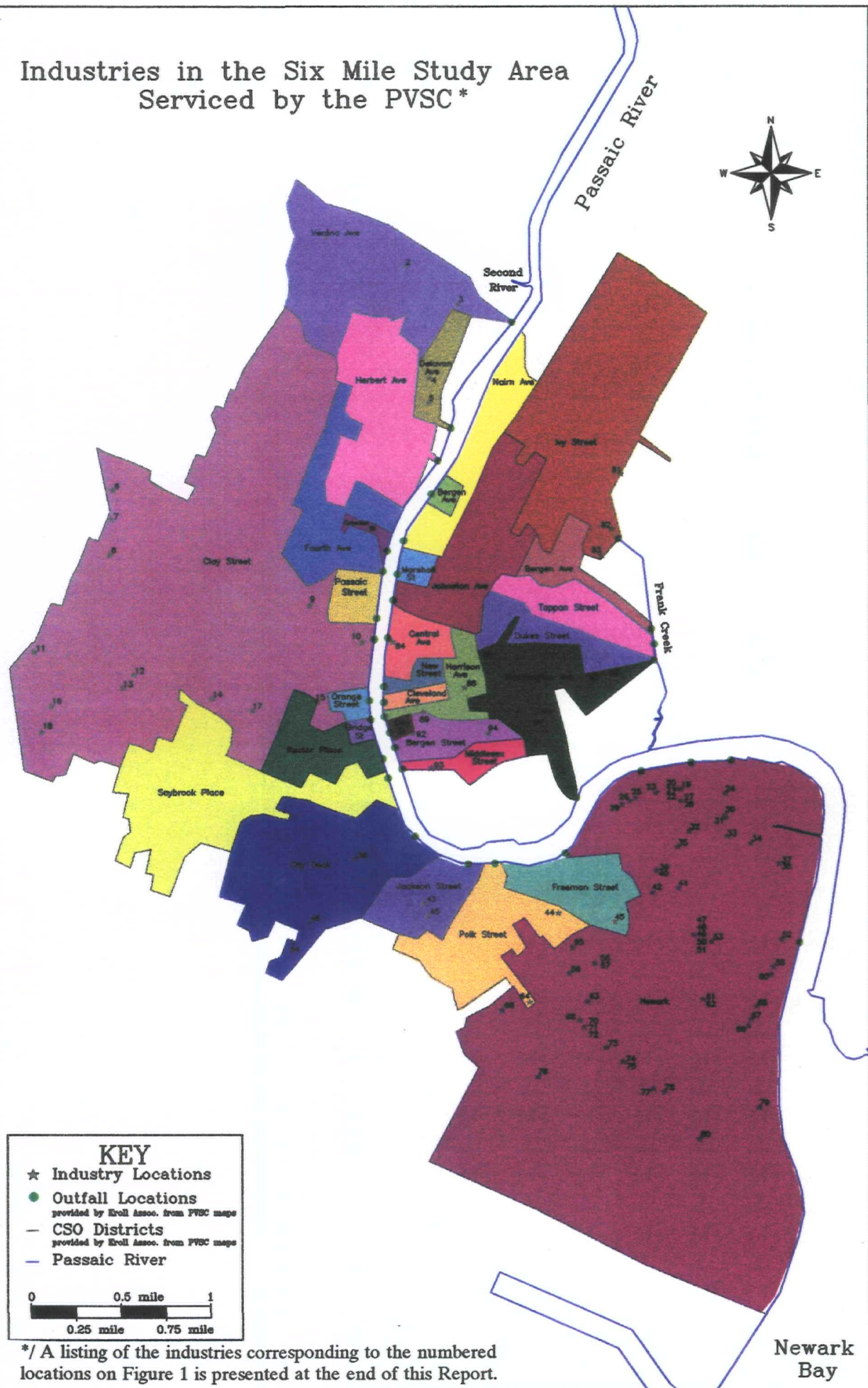
The PVSC's "trunk" or sewage collection line opened in 1924, and runs generally along the River to the PVSC's treatment plant near the mouth of the River. The municipal sewer systems were connected to the trunk line near the River adjacent to the old outfalls. After the trunk line was opened, effluent collected in the sewerage systems generally flowed down the discharge line and was diverted from the outfall to the trunk line. The trunk line carried the effluent to the PVSC's treatment plant. The original outfalls to the River for the systems remained. (Lubetkin Aff. at ¶¶ 7, 13)

The map of the Six Mile Study Area included as Figure 1 shows most of the sewage collection systems within the Six Mile Study Area and the location of their connections to the trunk line. On Figure 1, the colored areas represent the areas drained by the individual sewerage systems. Each colored area ends in a dot on the banks of the Passaic to show the location of the outfall associated with that system. The

² E.g. (Suszkowski, 1978); (Meyerson, *et al.* 1981); (Belton, *et al.*, 1985); (Bopp, *et al.*, 1991); (Bonnievie, *et al.*, 1992); (Gillis, *et al.*, 1993); (Gunster, *et al.*, 1993); (Interstate Sanitation Commission Annual Reports, 1939-Present); (Mytelka, *et al.*, 1973); (Brydon, 1974); (Sinderman and Swanson, 1979); (McCormick, *et al.*, 1983); (Hurley, 1992); (Squires, 1992). See List of References at the end of this Report for full citations.

Figure 1

Industries in the Six Mile Study Area Serviced by the PVSC*



* / A listing of the industries corresponding to the numbered locations on Figure 1 is presented at the end of this Report.

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trunk line runs along the River and is shown in Figure 2.³ The numbers shown within each colored area identify major industries within that drainage area that have been identified to date. A listing of the industries corresponding to the numbered locations on Figure 1 is presented at the end of this Report.

Newark, Harrison, Kearny and other municipalities within the PVSC's service area, have combined sewer systems. In these systems, stormwater flows into the sewer system along with sanitary wastes. Because of these combined systems, when it rains, the volume of material handled by PVSC's system and the trunk line expands substantially -- beyond the capacity of the trunk line and the treatment plant. Unless some of the material is removed from the system, sewage will back up or "surcharge" into points connected to the system, including private homes. Therefore, when it rains, the PVSC systematically diverts untreated effluent to the River, in varying amounts.

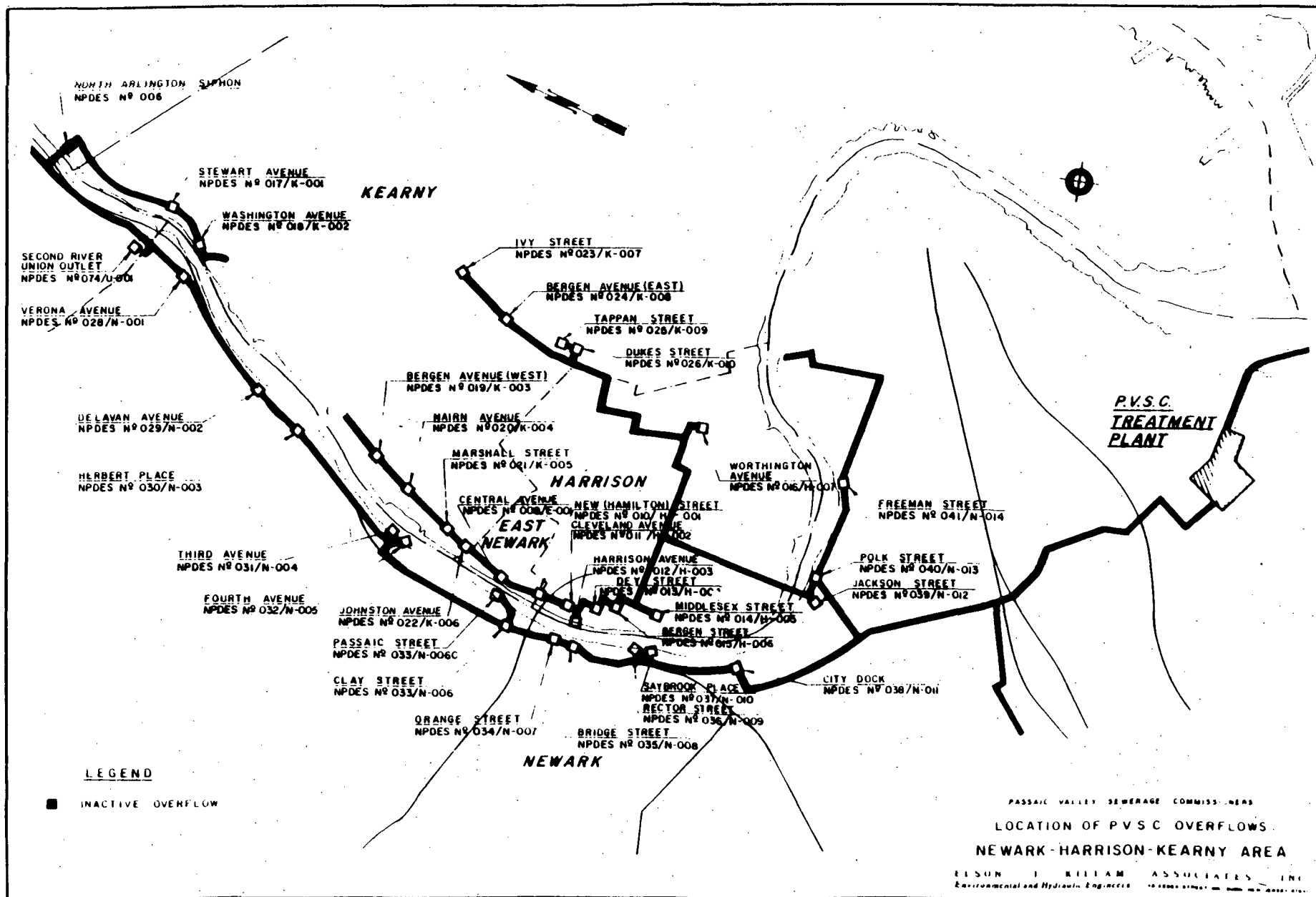
The PVSC was issued its first NPDES permit to operate these outfalls in 1975.⁴ In 1975, there were at least eighty-one outfalls into the Passaic River. (1975 NPDES Permit; Overflow Report at 124) Of this total, thirty-seven outfalls discharged directly into the Six Mile Study Area -- thirty operated by the PVSC and seven operated by the City of Newark. At various times since 1924, wastes have been bypassed to the Study Area from each of these thirty-seven outfalls. Figure 2, copied from the PVSC's Overflow Report, shows the portion of the trunk line within the Six Mile Study Area and identifies each of the PVSC-operated outfalls that discharge in or adjacent to the Study Area. Not all of the outfalls that could have potentially affected the Six Mile Study Area discharge within the Study Area. For example, at River Mile 7, just above the Six Mile Study Area, the Second River Joint Meeting Sewer joins the trunk line, with a corresponding outfall at the River bank. This Joint Meeting Sewer collects effluent in the towns of Montclair, Bloomfield, Orange, Belleville, Glen Ridge, East Orange, West Orange, Little Falls and some parts of Newark. (Overflow Report at 155) As Mr. Lubetkin explains, this large sewer was periodically discharged directly to the Passaic River. (Lubetkin Aff. at ¶ 30)

B. Mechanics

As explained by Mr. Lubetkin, before 1978, many of the outfalls worked automatically, with simple weirs over which waste would fall and flow to the River.

³ We based Figure 1 on the PVSC's Overflow Report and its careful descriptions of the PVSC's service area. Please note that the areas served by the City of Newark's outfalls are indicated only generally, because their precise boundaries were not described in the PVSC's Overflow Report.

⁴ A copy of this permit is included in the Appendix as an exhibit to Mr. Lubetkin's Affidavit. We believe that the City of Newark was issued its first NPDES permit to operate its outfalls after 1975. See PVSC Overflow Report at 123-126 (reporting "discovery" of the City of Newark outfalls).



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Figure 2

Others were controlled by manually operated valves. Many of the valves diverting waste to the outfall had been designed to open automatically when the level of effluent in the trunk line rose sufficiently. By the 1950s, Mr. Lubetkin explains, these automatic bypasses were clogged or inoperable and were replaced with manual systems. The PVSC employed a crew of men called the "bypass crew," to open enough outfalls to bypass sufficient effluent from the trunk line to the River to avoid backing up the system. The bypass crew was on call twenty-four hours a day. (Lubetkin Aff. at ¶¶ 15, 19) The bypasses still in use are now remotely controlled from within the PVSC's offices.

For example, Figure 3 is a schematic of the workings of a typical overflow, such as the Clay Street overflow, included in the PVSC's Overflow Report. The outlined arrows in the schematic show the waste flow during normal operation and the black arrows show the waste flow during bypass events. The area serviced by this outfall is colored pink on the map included as Figure 1. This outfall carries sewage collected in a total of 2874 acres, 1621 of which have combined sewers. (Overflow Report at 127) Figure 1 illustrates only the 1621-acre area served by this outfall with combined sewers -- it does not show the additional 1253 acres served with sanitary sewers that were also diverted to this outfall.

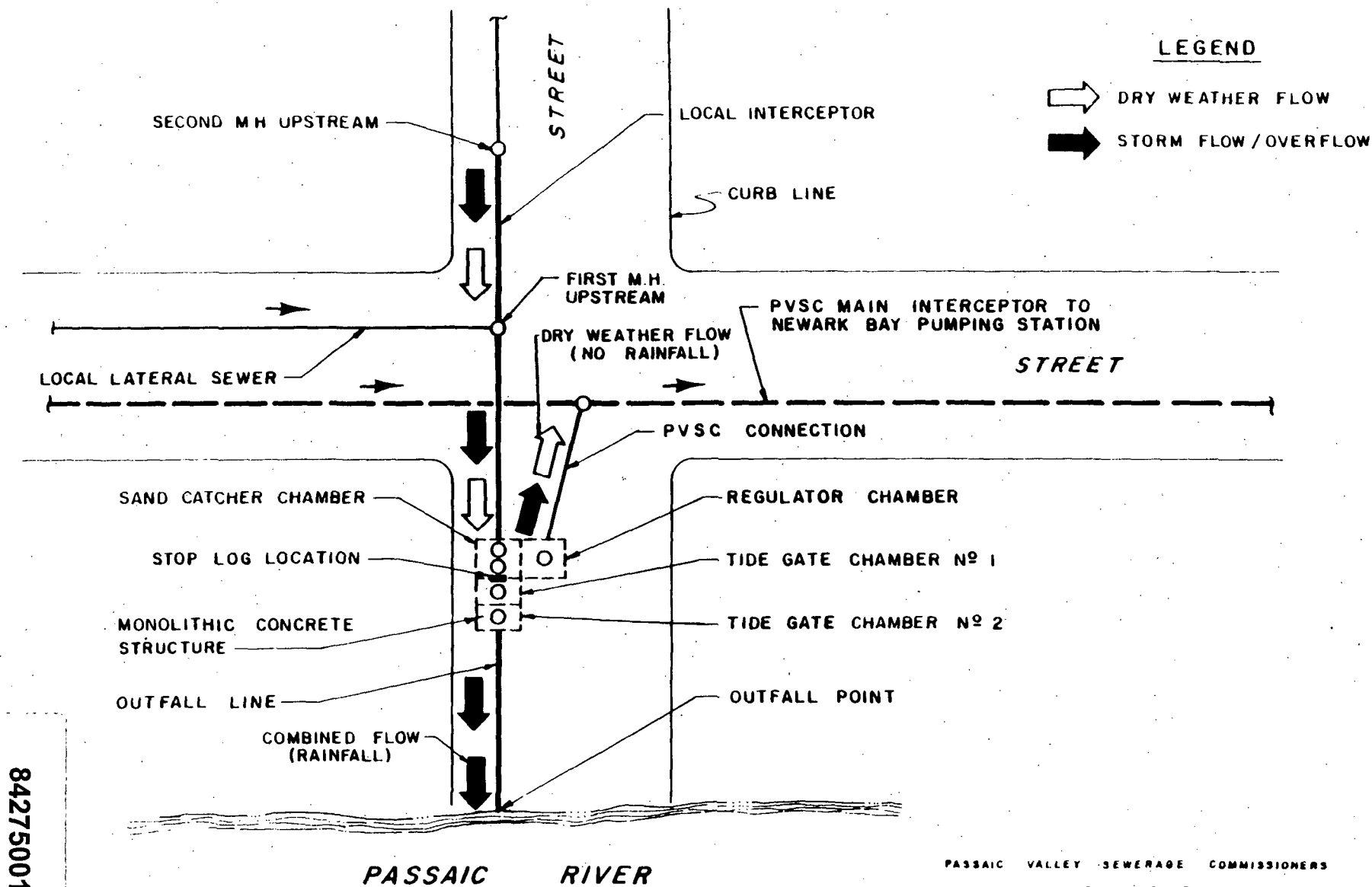
According to the PVSC's Overflow Report, the Clay Street bypass was overflowed automatically with every rain that had an intensity of .06 inches per hour or more. Thus, the Overflow Report concluded that "[i]t appears that overflow is likely to occur approximately 66 percent of the time that rainfall occurs." The PVSC's Overflow Report explains that the PVSC would manually increase the flow from this bypass to prevent surcharge or backing up through the system. (Overflow Report at 128-130).

C. Volume and Frequency of Bypassing

According to the PVSC's Report and Mr. Lubetkin, bypassing occurred in varying amounts with every significant rainfall. Where rainfall was the triggering event,⁵ the bypassing occurred at all hours of the day or night. According to the PVSC's Overflow Report, the bypassing occurred from each of the outfalls in the Six Mile Study Area.

The PVSC's Overflow Report estimates that in a single twelve-month period (October 1, 1974 through September 30, 1975), 7.6 billion gallons of effluent were bypassed untreated to the Passaic River -- approximately 8.2% of the total influent to the PVSC treatment plant during that year. (Overflow Report at 192-193) This figure does not include the amounts bypassed from the outfalls located on the south side of the

⁵ As Mr. Lubetkin's affidavit explains, bypassing also occurred or was required 1) where it was necessary to reduce flow in the line to repair the sewerage lines; 2) where discharges occurred accidentally; or 3) where, because of breakdowns at the treatment or pumping stations, it was necessary to reduce flow to prevent further damage. (Lubetkin Aff. at ¶ 18)



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PASSAIC VALLEY SEWERAGE COMMISSIONERS

TYPICAL OVERFLOW SCHEMATIC

ELSON F. RILLAM ASSOCIATES, INC.
Environmental and Hydraulic Engineers

Figure 3

City of Newark. During this one-year period, approximately 600 million gallons overflowed from the Joint Meeting Sewer outfall alone, just above the Six Mile Study Area.⁶

In addition to the routine bypassing that occurred during rainfall events, there are published reports of intermittent bypassing for repairs. For example, the PVSC's 1971 Annual Report explains that when flooding damaged the Second River Joint Meeting Sewer, a 400-foot section had to be replaced. During the repair period, August 28 to September 3, approximately 280 million gallons of untreated effluent were bypassed to the River. The 1974 PVSC Annual Report describes the near collapse of the trunk line under the McCarter Freeway. The repair of this section, in March 1974, required bypassing the entire contents of the entire trunk line for twenty-three days.

Based on the Overflow Report's conclusion that approximately 8.2% of the total influent to the PVSC treatment plant was bypassed during the period of study, Figure 4 presents the estimated amount bypassed because of rainfall during years 1971-1976 for which the PVSC's Annual Reports establish the volume of effluent treated. Figure 4 suggests that the PVSC bypassed approximately 46 billion gallons of effluent during this six-year period. This estimate does not include the effluent bypassed through the City of Newark's outfalls or the intermittent bypassing in 1971 or 1974 described above.

D. Conclusions

The bypassing practice was so systematic that the effluent of every subscriber within the PVSC's service area was diverted untreated to the River at one time or another. Therefore,

- **UNTREATED EFFLUENT HAS ROUTINELY BEEN DISCHARGED OR "BYPASSED" TO THE PASSAIC RIVER THROUGH MORE THAN THIRTY-FIVE OUTFALLS WITHIN THE SIX MILE STUDY AREA.**
- **THE BYPASSING PRACTICE BEGAN IN 1924 AND CONTINUES TO THE PRESENT DAY.**
- **SOME PORTION OF THE WASTE STREAM OF EVERY INDUSTRIAL DISCHARGER WITHIN THE PVSC SERVICE AREA WAS BYPASSED UNTREATED TO THE RIVER, WHETHER OR NOT THE INDUSTRIAL DISCHARGER MAINTAINED DIRECT OUTFALLS TO THE RIVER.**

⁶ Mr. Lubetkin explains that the PVSC maintained accurate records of the amounts bypassed because the PVSC used these records to calculate the rates charged to its municipal subscribers so that bypassing did not unfairly reduce the charges to any given municipality. (Lubetkin Aff. at ¶¶ 23-28) These records could be used to reconstruct the volume of waste bypassed each year for every year that records can be located.

Figure 4

**ESTIMATED VOLUME OF EFFLUENT
BYPASSED THROUGH PVSC OUTFALLS**

YEAR	VOLUME OF EFFLUENT TREATED* (GALLONS)	VOLUME OF EFFLUENT BYPASSED** (GALLONS)
1971	92,036,000,000	7,546,952,000
1972	94,507,000,000	7,749,574,000
1973	94,761,000,000	7,770,402,000
1974	89,221,000,000	7,316,122,000
1975	94,362,000,000	7,737,684,000
1976	91,684,000,000	7,518,088,000
TOTAL	556,571,000,000	45,638,822,000

* Source: PVSC Annual Reports

** Calculated based on the 8.2% ratio of effluent received at PVSC treatment plant to effluent bypassed, as reported in the PVSC's Overflow Report at 192-193.

PART IV THE EFFLUENT BYPASSED CONTAINED NUMEROUS HAZARDOUS SUBSTANCES INCLUDING PCDDs, PCDFs, METALS AND PESTICIDES

It is beyond the scope of this Report to review the literature concerning the chemistry of industrial waste discharges in Northern New Jersey between 1924 and the present. A brief review of only three sources of information confirms that the bypassing practice has contributed significantly to the present condition of the Six Mile Study Area, including the presence of PCDDs, PCDFs, metals and pesticides.

A. National Sewage Sludge Survey

EPA conducted a survey of treatment plant sludges, including the PVSC's, in 1988 called the National Sewage Sludge Survey ("NSSS"). This survey found that samples of the PVSC's sludge contained, among many other constituents:

- octachlorodibenzo-p-dioxin;
- octachlorodibenzofuran;
- heptachlorodibenzo-p-dioxin;
- heptachlorodibenzofurans;
- hexachlorodibenzo-p-dioxins;
- hexachlorodibenzofurans;
- pentachlorodibenzo-p-dioxins;
- pentachlorodibenzofurans;
- tetrachlorodibenzo-p-dioxins;
- tetrachlorodibenzofurans;
- 2,3,4,6,7,8-heptachlorodibenzo-p-dioxin;
- 2,3,4,6,7,8-heptachlorodibenzofuran;
- 2,3,4,7,8-hexachlorodibenzo-p-dioxin;
- 2,3,4,7,8-hexachlorodibenzofuran;
- 2,3,4,7,8,9-heptachlorodibenzofuran; and
- 2,3,6,7,8-hexachlorodibenzo-p-dioxin.

Each of these chemicals was found in Six Mile Study Area sediments.

The PVSC's sludge is the concentrate of all the waste streams the PVSC receives. Accordingly, the dioxins and furans listed above were not generated by the PVSC, but were passed through to the PVSC's sludge from the waste streams received by the PVSC. According to the 1988 NSSS, the PVSC was then serving 500,000 households, 362 industrial facilities, and 4,800 non-domestic dischargers. Among the entities serviced were four pulp and paper mills contributing almost twelve million gallons of effluent a day; nineteen pharmaceutical manufacturers contributing almost six million gallons a day; and thirty-eight organic chemical and synthetics manufacturers, contributing approximately eight million gallons of effluent per day.

The NSSS was conducted in 1988, at a time when many industries in the PVSC's service area had already instituted pretreatment systems. Because pretreatment removes or reduces the concentration of contaminants in a waste stream, it is reasonable to infer that waste streams received by the PVSC in earlier years (and bypassed to the Study Area) contained higher concentrations of contaminants.

B. Report Upon Investigation of Organic Priority Pollutants

The PVSC's study of organic priority pollutants in the influent to the PVSC plant in 1986 found that influent to the PVSC plant contained a number of the primary compounds associated with dioxin formulation. This study, Report Upon Investigation of Organic Priority Pollutants in the Influent to the Passaic Valley Sewerage Treatment Plant (CFM, Inc.) (May 1986) ("Organic Priority Pollutants Report"), did not test for the presence of PCDDs, PCDFs, PCBs or metals. However, it identified chemicals in the influent to the PVSC's treatment plant and at the Brown Street interceptor that are associated with dioxin compounds. These chemicals are identified in Figure 5:

FIGURE 5

CHEMICALS DETECTED IN PVSC INFLUENT IN 1986

Class I*: Chemicals with a strong likelihood of polyhalogenated dibenzo-p-dioxin association (PCDD)

	<u>Average Daily Lbs./Day</u>	
	<u>Plant</u>	<u>Brown St.</u>
• 2,4 Dichlorophenol	253.5	1.4
• Pentachlorophenol	425.0	1.6
• 2,4,6 Trichlorophenol	173.6	21.7

Class II*: Chemicals with a strong likelihood of association with other dioxin compounds.

• Chlorophenol	212.9	1.2
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Source: PVSC, Organic Priority Pollutants Report

* Class I and Class II designation as defined in Esposito (1980).

This 1986 study also detected many other constituents in the PVSC's influent, including many volatile organics and pesticides. (Organic Priority Pollutants Report, Table 2) The samples taken at the treatment plant represent all the influent received. The Brown Street interceptor serves the portions of the Ironbound area of Newark where many industries are located. The Brown Street interceptor samples reflect the principally industrial waste streams collected there.

The chemicals listed above in Figure 5, along with many others detected in the Organic Priority Pollutants Survey, were found in Six Mile Study Area sediments. This study was completed in 1986 after many industries had instituted pretreatment programs. Similar studies performed before pretreatment was widespread would therefore most likely have shown even higher concentrations.

C. PVSC Heavy Metal Source Determination

Finally, the PVSC has conducted a systematic analysis of the sources of heavy metals in the influent to its treatment plant. That study, PVSC Heavy Metals Source Determination ("Heavy Metals Report"), was completed in 1978 in compliance with the conditions EPA included in PVSC's Interim Ocean Dumping Permit issued in 1976. This report found large concentrations of the following metals in the influent to the PVSC treatment plant:

FIGURE 6

HEAVY METAL LOADING IN PVSC'S INFLUENT IN 1978

	<u>Mean Lbs./Day</u>
Cadmium	67.8
Chromium	1523.2
Copper	999.1
Lead	1869.3
Mercury	118.6
Nickel	990.6
Zinc	5693.6

Source: PVSC, Heavy Metals Source Determination (1978), Appendix B, Part VII

These chemicals were also found in Six Mile Study Area sediments.

D. Conclusion

Figure 7 lists the hazardous substances that have been found in Study Area sediments that have also been identified in PVSC influent, as documented in the three publicly available reports discussed above. As Figure 7 illustrates:

THE SYSTEMATIC BYPASSING INCLUDED PCDDS, PCDFS, PCB, METALS, AND OTHER HAZARDOUS SUBSTANCES NOW FOUND IN THE SIX MILE STUDY AREA SEDIMENTS.

FIGURE 7

CHEMICALS IN SURFACE AND BURIED SEDIMENTS IN THE SIX MILE STUDY AREA KNOWN TO HAVE BEEN IN PVSC INFLUENT

Dioxins	Furans	Metals*	Semi-Volatile Organics*
s 2,3,7,8-TCDD	s 2,3,7,8-TCDF	s Antimony	o Acenaphthylene
s 1,2,3,7,8-PeCDD	s 1,2,3,7,8-PeCDF	s,m Arsenic	o Anthracene
s 1,2,3,4,7,8-HxCDD	s 2,3,4,7,8-PeCDF	s Barium	o Benzo(a)anthracene
s 1,2,3,6,7,8-HxCDD	s 1,2,3,4,7,8-HxCDF	s,m Cadmium	o Benzo(a)pyrene
s 1,2,3,7,8,9-HxCDD	s 1,2,3,6,7,8-HxCDF	s,m Chromium	o Benzo(g,h,i)perylene
s 1,2,3,4,6,7,8-HpCDD	s 1,2,3,7,8,9-HxCDF	s,m Copper	s,o Bis(2-ethyl/hexyl)phthalate
s OCDD	s 2,3,4,6,7,8-HxCDF	s,m Lead	o Chrysene
	s 1,2,3,4,6,7,8-HpCDF	s,m Mercury	o Dibenzo(a,h)anthracene
	s 1,2,3,4,7,8,9-HpCDF	s,m Nickel	o Fluoranthene
		s Silver	o Naphthalene
		s,m Zinc	o Phenanthrene
			o Pyrene

s = EPA Sludge Survey (1988)

m = PVSC Heavy Metal Source Determination Study (1978)

o = PVSC Investigation of Organic Priority Pollutants (1986)

* Because of the large number of toxic metals and semi-volatile organics measured in sediments and influent, only those exceeding benchmark sediment quality values are listed.

PART V PUBLIC DOCUMENTS CONTAIN SUFFICIENT INFORMATION TO ESTABLISH THE CERCLA LIABILITY OF INDUSTRIES IN THE PVSC'S SERVICE AREA

A. Introduction

As discussed above, there are several studies of the quality of this PVSC influent that correlate to conditions in Study Area sediments. There are also public records that establish the presence of hazardous substances in specific industrial waste streams committed to the PVSC system.

This section of the Report briefly reviews some of the public records available concerning three industrial wastewater generators within the PVSC's service area. The examples are organized in the following manner:

- a brief narrative description of the industry, the CSO district it lies within, and the CSO's connection to the Passaic River;
- a map depicting the location of the industry, the CSO district, the location of the outfall to the Passaic River, and the sediment sampling locations from the Passaic River adjacent to the outfall; and
- a chart summarizing the supporting documentation included in the Appendix that illustrates the nexus between the industrial generator and the contamination of the Passaic River.

These records, in conjunction with the evidence of the practice of bypassing and the studies of the Passaic River, provide evidence of all the elements of a CERCLA liability claim against the individual industrial generator: that industrial facilities within the Six Mile Study Area discharged hazardous substances to the PVSC sewers; that these sewers were diverted to the River; and that the River contains hazardous substances like those generated by the industry.⁷

⁷ The elements of a CERCLA liability claim are that the person arranged for the disposition of hazardous substances, at a facility, and there has been a release or threat of release of hazardous substances like those contributed by the generator. *United States v. Alcan Aluminum Co.*, 990 F.2d 711, 719-20 (2d Cir. 1993); *Amoco Oil Co. v. Borden, Inc.*, 889 F.2d 668 (5th Cir. 1989). Because "arrange for the disposition of" does not include specifying the final destination, generators are liable when they are unaware of where their waste is deposited. *United States v. Conservation Chemical Co.*, 619 F. Supp. 162 (W.D. Mo. 1985); *United States v. Ward*, 618 F. Supp. 884 (E.D.N.C. 1985).

B. Examples

1. Drew Chemical Corp.

Drew Chemical Company ("Drew"), a division of Ashland Oil Company, has operated a chemical formulation facility in Harrison, New Jersey since 1970. It has produced water treatment chemicals, boiler compounds, paint defoamers and other specialty chemicals.

Wastewater from Drew's operations are discharged to the PVSC's combined sewer system within the Worthington Avenue CSO service area. See Figure 8. The Worthington CSO services a total area of 225 acres in East Newark, Kearny, and Harrison. The estimated maximum overflow capacity to the River from this CSO district is nine million gallons per day. (Overflow Report at 162) In addition, during wet weather, groundwater seeps into the sewerage system. The Worthington Avenue CSO discharges to the Passaic River at approximately the same location as sediment sampling stations 15 and 16.

Figure 9 summarizes the publicly available documents illustrating the nexus between Drew Chemical and the contamination of the Passaic River.⁸

⁸ These records are collected and indexed in Volume 2 of the Appendix.

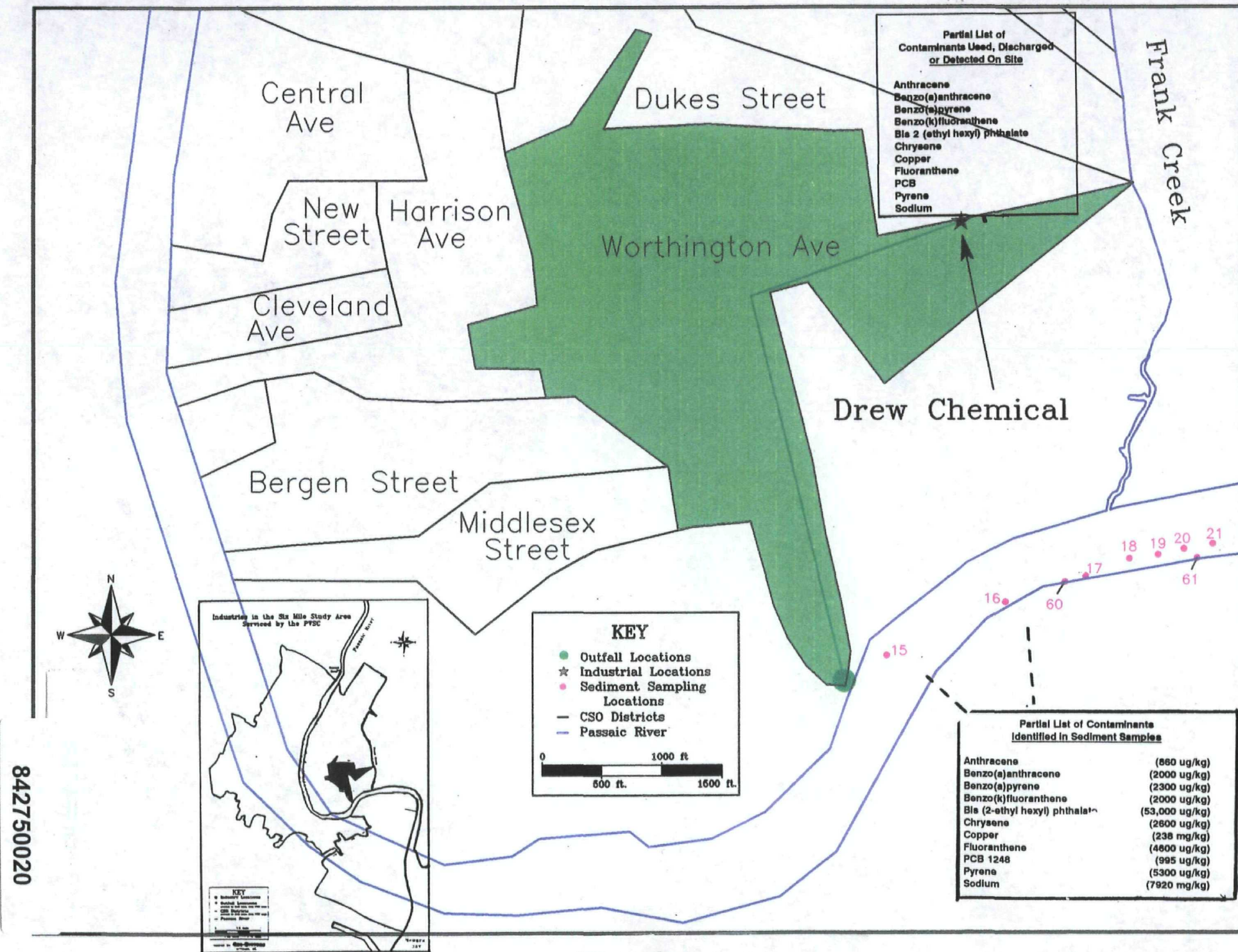


Figure 8

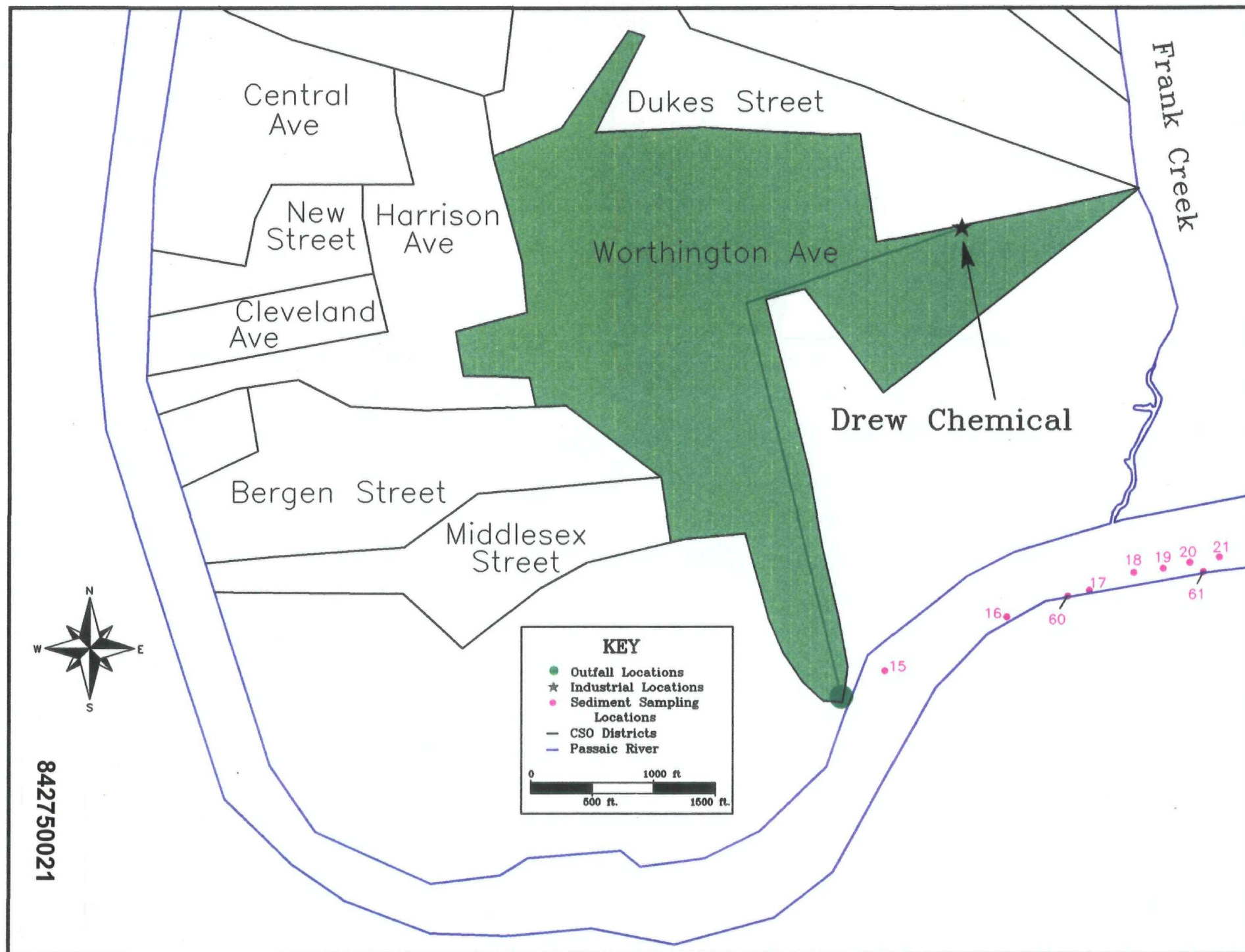


Figure 8

FIGURE 9
DREW CHEMICAL SUMMARY CHART

MATERIALS USED	CONTAMINANTS DOCUMENTED IN EFFLUENT	CONTAMINANTS DETECTED ON SITE (SOIL OR GROUNDWATER)	CONTAMINANTS IN STUDY AREA SEDIMENT LIKE THOSE USED, DISCHARGED, OR DETECTED AT DREW
<u>1971</u> Phosphoric Acid Isopropanol <u>1974</u> Acetic Acid Trichlorophenol* <u>1980</u> 1,1,1 Trichloroethane Sodium Hydroxide Zinc chloride Organic phosphorus Dichlorotoluene Mineral spirits Ethylene diamine Methanol <u>1985</u> Methylene Chloride Tetrachloroethylene 1,1,1 Trichloroethane Phenol (Cresylic Acid)*** Butyl Alcohol Isobutyl alcohol Toluene <u>1988</u> Mineral seal oil 1,1,1 trichloroethane Morpholine Dichlorotoluene Formic Acid Triethanolamine	<u>1972</u> Calcium Magnesium Iron Copper <u>1975</u> Aluminum Copper Iron Magnesium Manganese Sodium Silver Calcium <u>1982</u> Washdown water from reactor vessel <u>1986</u> Phenols*** <u>1989</u> Ethylene glycol Zinc compounds Acrylamide Chromium compounds Phosphoric acid Glycol ethers Zinc compounds	<u>1992 Soil</u> Anthracene Fluoranthene Pyrene Butyl benzyl phthalate Bis 2 (ethyl hexyl) phthalate Chrysene Di-n-octylphthalate Benzo (b) fluoranthene 4-Methylphenol 2-Methyl Naphthalene Trimethyl/naphthalene Isomer PCB Toluene 1-Methylnaphthalene Fluorene Phenanthrene Benzo (a) anthracene Benzo (k) fluoranthene Benzo (a) pyrene	<u>Sample 15</u> Anthracene (860 ug/kg) Fluoranthene (4,600 ug/kg) Pyrene (5,300 ug/kg) Chrysene (2,600 ug/kg) Bis(2-ethylhexyl)phthalate (38,000 ug/kg) Di-n-octyl phthalate (840 ug/kg) Benzo(b)fluoranthene (2,000 ug/kg) PCB 1248 (995 ug/kg) Benzo(a)anthracene (2,000 ug/kg) Benzo(k)fluoranthene (2,000 ug/kg) Benzo(a)pyrene (2,300 ug/kg) Phenanthrene (2,000 ug/kg) Aluminum (17,300 mg/kg) Calcium (2,950 mg/kg) Copper (238 mg/kg) Magnesium (8,640 mg/kg) Silver (6.2 mg/kg) Sodium (7,920 mg/kg) Zinc (83.3 mg/kg) <u>Sample 16</u> 2 methylnaphthalene (3,300 ug/kg) Anthracene (6,600 ug/kg) Fluoranthene (9,600 ug/kg) Pyrene (17,000 ug/kg) Butyl benzyl phthalate (740 ug/kg) Chrysene (7,600 ug/kg) Bis (2 ethylhexyl) phthalate (53,000 ug/kg) Di-n-octyl phthalate (6,900 ug/kg) Benzo(b)fluoranthene (4,400 ug/kg) PCB 1254 (865 ug/kg) PCB 1248 (3,530 ug/kg) Fluorene (3,400 ug/kg) Phenanthrene (16,000 ug/kg) Benzo(a)anthracene (7,500 ug/kg) Benzo(k)fluoranthene (2,800 ug/kg) Benzo(a)pyrene (5,400 ug/kg)

Cont.

- * Class I: Chemicals with a strong likelihood of polyhalogenated dibenzo-p-dioxin association.
** Class II: Chemicals with a strong likelihood of an association with other dioxin compounds.
*** Class III: Chemicals with a moderate probability of dioxin association. Source: Esposito (EPA, 1980)

FIGURE 9
DREW CHEMICAL SUMMARY CHART

MATERIALS USED	CONTAMINANTS DOCUMENTED IN EFFLUENT	CONTAMINANTS DETECTED ON SITE (SOIL OR GROUNDWATER)	CONTAMINANTS IN STUDY AREA SEDIMENT LIKE THOSE USED, DISCHARGED, OR DETECTED AT DREW
1992 Acrylamide Acrylic Acid Aluminum Sulfate Ammonium bicarbonate Ammonium bifluoride Benzoic Acid Cresylic Acids*** Diethylamine Dodecylbenzene sulfonic Acid Butanol Ferric chloride Ferrous sulfate Hydrazine Methyl ethyl ketone Methylene chloride Phenols*** Phosphoric Acid Sodium bisulfite Sodium Chromate Sodium hypochlorite Sulfuric Acid Zinc Chloride Zinc Nitrate Zinc Sulfate Epichlorohydrin Ortho benyl chlorophenol*** Trichloroethane			Sample 16 (Continued) Aluminum (19,600 mg/kg) Calcium (24,800 mg/kg) Copper (875 mg/kg) Lead (907 mg/kg) Magnesium (7,080 mg/kg) Manganese (554 mg/kg) Silver (13.3 mg/kg) Sodium (6,830 mg/kg) Zinc (1,760 mg/kg)
<p>* Class I: Chemicals with a strong likelihood of polyhalogenated dibenzo-p-dioxin association.</p> <p>** Class II: Chemicals with a strong likelihood of an association with other dioxin compounds.</p> <p>*** Class III: Chemicals with a moderate probability of dioxin association. Source: Esposito (EPA, 1980)</p>			

2. Ashland Chemical Company

Ashland Chemical Company, located at 221 Foundry Street, Newark, New Jersey, has received and stored on site a wide range of specialty chemicals since 1968. These chemicals are repackaged into smaller bulk lots for distribution to customers. Ashland also processes and blends solvent mixtures on site.

Ashland Chemical Company discharged effluent to the PVSC's system within the Roanoke Avenue CSO service area. *See* Figure 10. The Roanoke Avenue CSO services a large portion of the heavily industrialized section of Newark that includes Avenue P, Doremus Avenue, and Foundry Street.

Figure 11 summarizes publicly available documents illustrating the nexus between Ashland Chemical and the contamination of the Passaic River.⁹

⁹ These documents are collected and indexed behind Volume 3 of the Appendix.

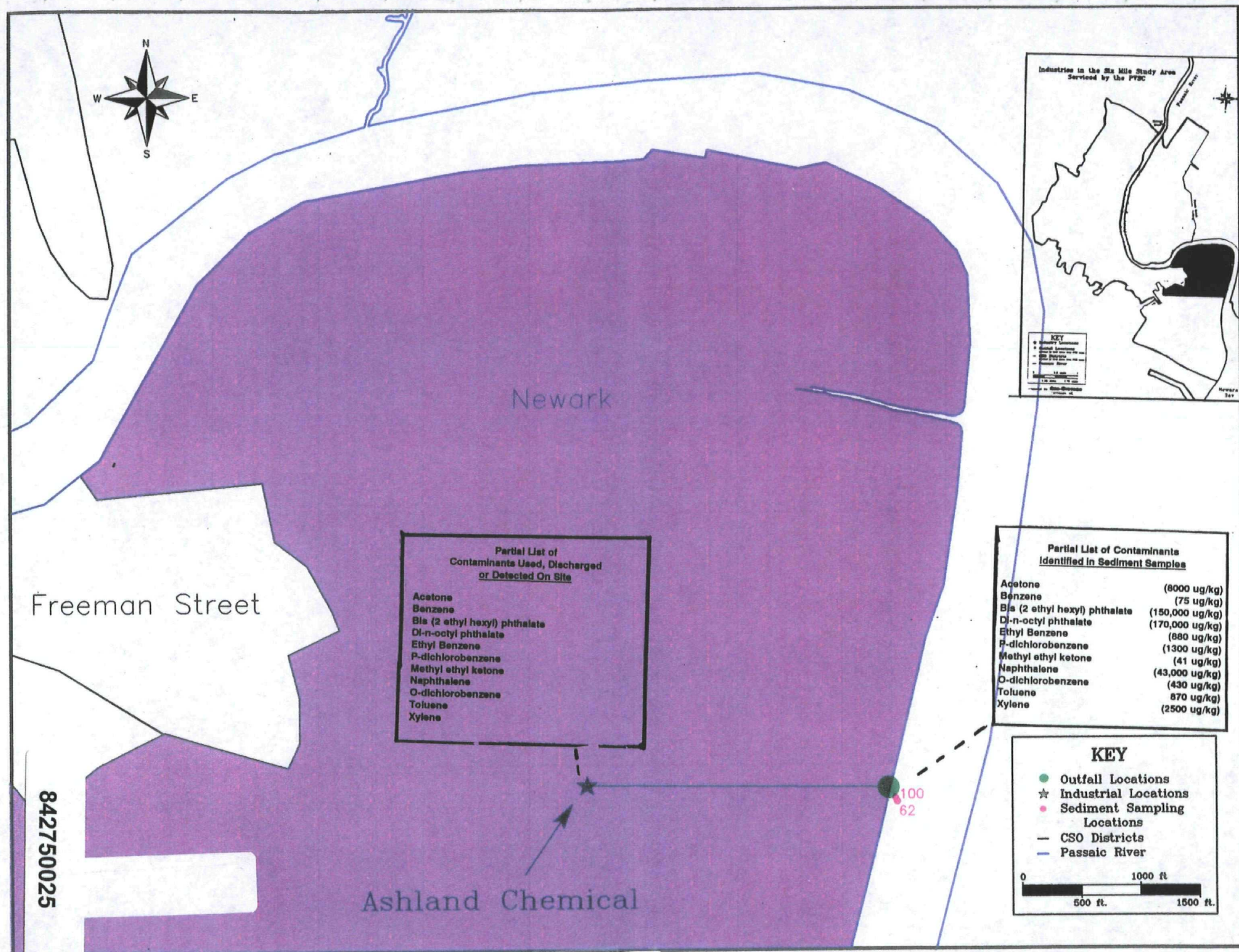


Figure 10

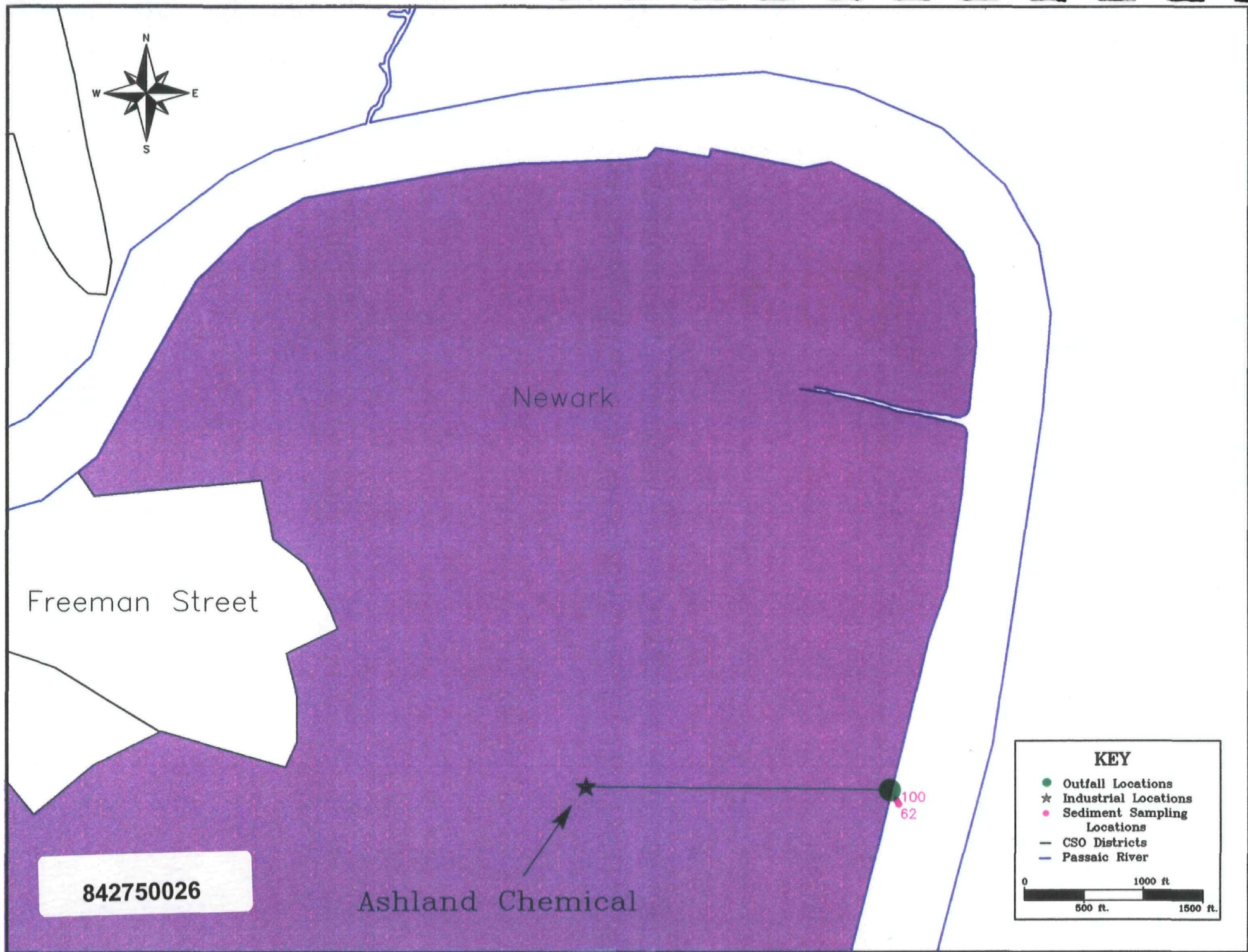


Figure 10

FIGURE 11
ASHLAND CHEMICAL SUMMARY CHART

MATERIALS USED	CONTAMINANTS DOCUMENTED IN EFFLUENT	CONTAMINANTS DETECTED ON SITE (SOIL OR GROUNDWATER)	CONTAMINANTS IN STUDY AREA SEDIMENT LIKE THOSE USED, DISCHARGED, OR DETECTED AT ASHLAND
<p><u>1979</u> Trichloroethylene o-dichlorobenzene*** Methylene chloride Methanol Ethanol Perchloroethylene Amyl acetate Acetone Methyl isobutyl ketone N-butyl alcohol Cyclohexanone Ethyl acetate Xylene Tetra hydro furan Isobutyl alcohol Methyl ethyl ketone Methyl alcohol Toluene Butyl acetate 1,1,1 trichloroethane Dibutyl phthalate Ethyl acetate Cyclohexane</p> <p><u>1980</u> Copper cyanides Acetaldehyde Acetophenone Aniline Benzene Bis(2 ethylhexyl)phthalate 1-butanol Chlorobenzene**** Chloroform Cumene Cyclohexane Cyclohexanone Di butyl phthalate o-dichlorobenzene*** m-dichlorobenzene p-dichlorobenzene Dimethylamine Dimethyl phthalate Dimethyl sulfate Di-n-octyl phthalate 1,4 dioxane Dipropylamine Ethyl acetate Ethyl ether</p>	<p><u>1971</u> Ashland discharged highly polluting materials which were flammable & explosive to the Roanoke Ave. sewer.</p> <p><u>1976</u> Spills resulting from tank cleaning were discharged to sewer. A 1976 letter from PVSC stated that Ashland had allowed flammable chemicals to enter the Roanoke Ave. sewer in the past.</p> <p><u>1979</u> NJDEP inspectors documented presence of product in storm sewer system on site.</p> <p><u>1983</u> Neutralized waste product from acid drumming operation.</p> <p>Line flush containing acetates, alcohols, Ketones or nitrogen which could also contain any of the materials used.</p>	<p><u>1979</u> G.W. contaminated with oil & solvents.</p> <p><u>1988</u> <u>Surface Water</u> Chloroethane 1,1 dichloroethane 1,1,1 trichloroethane Trans 1,2-dichloroethene Methylene chloride Vinyl chloride 1,1 dichloroethylene Xylenes Mineral spirits 1,2 dichloroethane Trichloroethylene</p> <p><u>Soil</u> Ethyl benzene Toluene Vinyl chloride Benzene 1,2 dichloroethane 1,1 dichloroethylene 1,1,1 trichloroethane Trichloroethylene Tetrachloroethylene 1,1 dichloroethane Xylene 4-methyl-2-pentanone Mineral spirits</p> <p><u>Groundwater</u> Arsenic Cadmium Chromium Copper Lead Nickel Zinc Volatile organic compounds Halogenated VOCs Aromatic VOCs Ketones Petroleum distillates 1,1,1 trichloroethane</p>	<p><u>Sample 100</u> Ethyl benzene (680 ug/kg) p-dichlorobenzene (1,300 ug/kg) 2,3,7,8 TCDD (130 ng/kg) Total TCDD (1,180 ng/kg) o-dichlorobenzene (430 ug/kg) Xylene (2,500 ug/kg) Toluene (870 ug/kg) Naphthalene (43,000 ug/kg) Benzene (75 ug/kg) Methylene chloride (29 ug/kg) Acetone (420 ug/kg) Methyl ethyl ketone (94 ug/kg) Dibenzofuran (74,000 ug/kg) Di-n-butyl phthalate (38,000 ug/kg) Bis(2 ethylhexyl)phthalate (150,000 ug/kg) Di-n-octyl phthalate (170,000 ug/kg)</p> <p><u>Sample 62</u> Methylene chloride (37 ug/kg) Acetone (8,000 ug/kg) Methyl ethyl ketone (41 ug/kg) Bis (2 ethyl hexyl) phthalate (13,000 ug/kg) Di-n-octyl phthalate (430 ug/kg)</p>
<p>*** Class III: Chemicals with a moderate probability of dioxin association. Source: Esposito (EPA, 1980)</p> <p>**** Dioxin precursor chemical regulated by EPA (52 Fed. Reg. 21,437 (June 5, 1987); 40 C.F.R. §§ 707,766 (1993)).</p>			<p style="text-align: right;">Cont.</p>

FIGURE 11
ASHLAND CHEMICAL SUMMARY CHART

MATERIALS USED	CONTAMINANTS DOCUMENTED IN EFFLUENT	CONTAMINANTS DETECTED ON SITE (SOIL OR GROUNDWATER)	CONTAMINANTS IN STUDY AREA SEDIMENT LIKE THOSE USED, DISCHARGED, OR DETECTED AT ASHLAND
<p>1980 (continued)</p> <p>2-furan carboxaldehyde</p> <p>Hydrofluoric acid</p> <p>Isobutyl alcohol</p> <p>Maleic anhydride***</p> <p>Methyl alcohol</p> <p>Methyl ethyl ketone peroxide</p> <p>Naphthalene</p> <p>2 nitropropane</p> <p>Phosphorus sulfide</p> <p>Phthalic Anhydride***</p> <p>1-propanamine</p> <p>Tetrachloroethylene</p> <p>Tetrahydrofuran</p> <p>Thiourea</p> <p>Toluene</p> <p>Toluene diisocyanate</p> <p>Methyl chloroform</p> <p>Trichloroethene</p> <p>Aliphatic hydrocarbons</p> <p>Aromatic hydrocarbons</p> <p>Acids</p> <p>Alcohols</p> <p>Alkines</p> <p>Amines</p> <p>Esters</p> <p>Ethers</p> <p>Glycols</p> <p>Halogenated solvents</p> <p>Ketones</p> <p>Nitro Paraffins</p> <p>Cyclohexane</p> <p>Solvents</p> <p>Dimethyl formaldehyde</p> <p>Laktane</p> <p>Mineral spirits</p> <p>Plasticizers</p> <p>Toluene</p> <p>Xylene</p> <p>Naphthalene</p> <p>o-dichlorobenzene***</p> <p>Tetra hydro furan</p> <p>Trichloroethylene</p> <p>Methylene chloride</p> <p>Perchloroethylene</p> <p>Methyl ethyl ketone</p> <p>1,1,1 trichloroethane</p> <p>Acetone</p>			
<p>*** Class III: Chemicals with a moderate probability of dioxin association. Source: Esposito (EPA, 1980)</p> <p>**** Dioxin precursor chemical regulated by EPA (52 Fed. Reg. 21,437 (June 5, 1987); 40 C.F.R. §§ 707,766 (1993)).</p>			

3. Sun Chemical Company

Sun Chemical Company currently operates and has operated since 1967 a chemical formulation facility at 185 Foundry Street, Newark, New Jersey. Sun Chemical manufactures quincidone pigments used in the automobile and plastic industries.

Sun Chemical discharged wastewater through a strip drainage system connected to the PVSC sewer system that flowed into the Roanoke Avenue CSO. *See* Figure 12. As we have already pointed out, the Roanoke CSO has been identified as a major source of pollution to the Passaic River.

Figure 13 summarizes publicly available documents illustrating the nexus between Sun Chemical and the contamination of the Passaic River.¹⁰

¹⁰ These documents are collected and indexed behind Volume 4 of the Appendix.

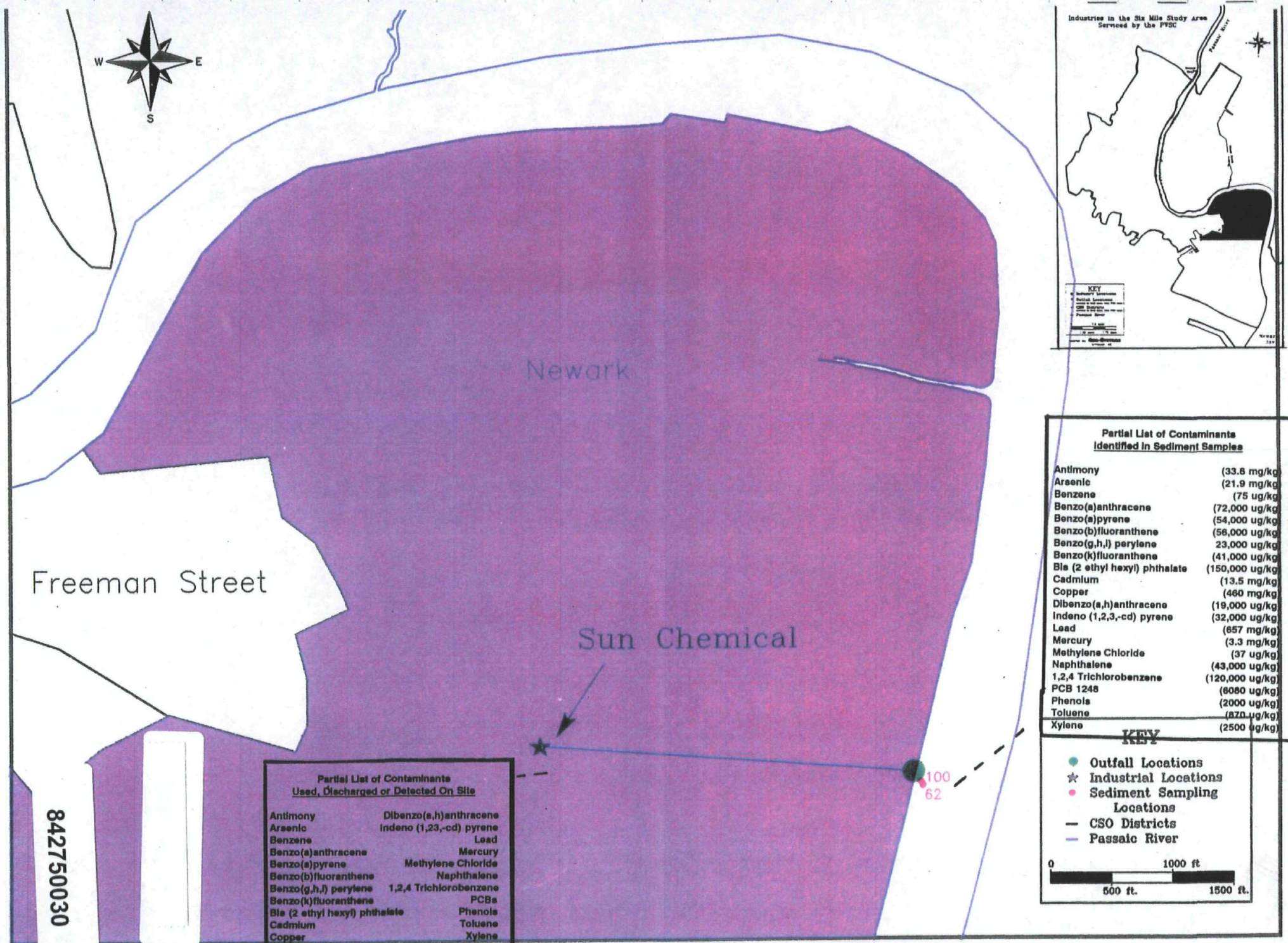


Figure 12

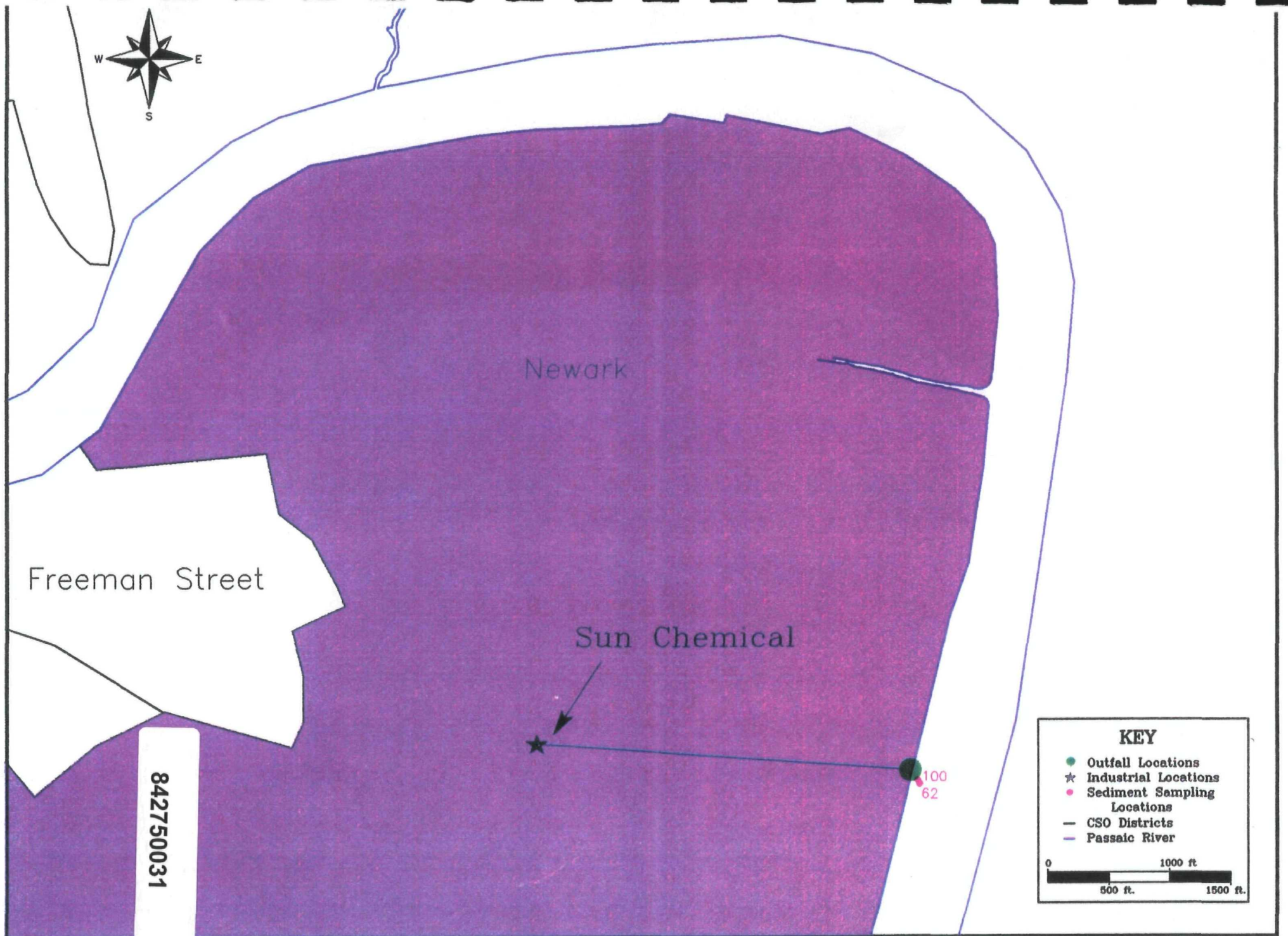


Figure 12

FIGURE 13
SUN CHEMICAL SUMMARY CHART

MATERIALS USED	CONTAMINANTS DOCUMENTED IN EFFLUENT	CONTAMINANTS DETECTED ON SITE (SOIL OR GROUNDWATER)	CONTAMINANTS IN STUDY AREA SEDIMENT LIKE THOSE USED, DISCHARGED, OR DETECTED AT SUN
<u>1975</u> Polyphosphoric acid Dianilino-terephthalic acid Caustic soda 2,5-di-p-toluidino-terephthalic acid Methanol Isopropanol <u>1980</u> Phosphoric Acid Acetic acid <u>1987</u> 2,5-di-(p-chloroanilino) telephthalic acid Quinacridone Violet Pigment Quinacridone Magenta Pigment Quinacridone Pigment Red	All process waste is neutralized then discharged to sewer. <u>1976</u> Mercury Cyanide salts Methanol Isopropanol Cyanide <u>1978</u> Plant process wastes were being discharged to floor drains which connect to sewer system. These wastes were found by PVSC to be highly polluting and which had a Ph of 1.7. <u>1979</u> Plant effluent is directed through neutralization tanks then to sanitary sewer. Phenols*** <u>1981</u> Phenols*** <u>1988</u> Benzene 1,1,1 Trichloroethane Chloroform Methylene Chloride Methyl Chloride (chloromethane) Toluene Chloroethane Dibromochloromethane Lead Zinc <u>1989</u> Methanol Phosphoric Acid	<u>1986</u> <u>Sediment & Soil</u> Naphthalene 2-methylnapthalene Di-n-butyl phthalate Bis (2-ethylhexyl) Phthalate Brominated compounds Antimony Arsenic Cadmium Chromium Copper Lead Mercury Nickel Zinc <u>1988</u> 1,2,4 Trichlorobenzene*** Antimony Arsenic Beryllium Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver Thallium Zinc PCBs PHC B/N VOCs Phenols*** <u>1988</u> <u>Groundwater</u> PCBs PHC BN VO Metals	<u>Sample 100</u> 1,2,4 Trichlorobenzene (120,000 ug/kg) Benzene (75 ug/kg) Ethyl benzene (680 ug/kg) Acetone (420 ug/kg) 2 butanone (94 ug/kg) Methylene chloride (29 ug/kg) Benzene (75 ug/kg) Toluene (870 ug/kg) Phenols (2,000 ug/kg) Naphthalene (43,000 ug/kg) PCB 1248 (6,080 ug/kg) Antimony (35.6 ug/kg) 2 methylnapthalene (38,000 ug/kg) Di-n-butyl phthalate (38,000 ug/kg) Bis (2-ethylhexyl) phthalate (150,000 ug/kg) Xylene (2,500 ug/kg) Mercury (3.2 mg/kg) Benzo(a)anthracene (72,000 ug/kg) Chrysene (82,000 ug/kg) Benzo(b)fluoranthene (56,000 ug/kg) Benzo(k)fluoranthene (41,000 ug/kg) Benzo(a)pyrene (54,000 ug/kg) Indeno (1,2,3-cd)pyrene (32,000 ug/kg) Dibenzo(a,h)anthracene (19,000 ug/kg) Benzo (g,h,i)perylene (23,000 ug/kg) <u>Sample 62</u> Bis (2-ethylhexyl) phthalate (13,000 ug/kg) Methylene chloride (37 ug/kg) PCB 1248 (2,010 ug/kg) Antimony (33.6 mg/kg) Arsenic (21.9 mg/kg)

Cont.

** Class II: Chemicals with a strong likelihood of an association with other dioxin compounds.

*** Class III: Chemicals with a moderate probability of dioxin association. Source: Esposito (EPA, 1980)

FIGURE 13
SUN CHEMICAL SUMMARY CHART

MATERIALS USED	CONTAMINANTS DOCUMENTED IN EFFLUENT	CONTAMINANTS DETECTED ON SITE (SOIL OR GROUNDWATER)	CONTAMINANTS IN STUDY AREA SEDIMENT LIKE THOSE USED, DISCHARGED, OR DETECTED AT SUN
	<p><u>1990</u> Sewer system on site Contaminated with VOCs B/Ns Organic acids Cyanides Metals Phenols PCBs</p> <p><u>1991</u> Chloromethane Chloroethane Chloroform Bromodichloromethane Xylenes Toluene 1,2,4 Trichlorobenzene*** Bis(2ethylhexyl)phthalate Zinc</p> <p><u>1992</u> Di-n-butyl phthalate Isophorone Chloromethane Chloroethane Bis(2ethylhexyl)phthalate Nitrobenzene Bromodichloromethane Chloroform Toluene Xylenes Lead Methanol Phosphoric acid</p> <p><u>1993</u> Aniline 4-chloroaniline Nitrobenzene Chloromethane Acetone 4-methyl-2-pentanone Bis(2ethylhexyl)phthalate 2-butanone</p>	<p><u>1989</u> <u>Sediment & Soils</u> B/Ns VOCs PHCs PCBs Arsenic Cadmium Lead Mercury Zinc</p> <p><u>1992</u> <u>Groundwater</u> PCBs</p> <p><u>1993</u> <u>Soil</u> PCBs PHC Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno (1,2,3-cd) pyrene Benzo(g,h,i)perylene Dibenzo (a,h)anthracene Benzene Ethyl benzene Toluene Xylenes Copper Lead</p> <p><u>Wipe samples from building</u> PCBs</p> <p>Site is under active groundwater remediation.</p>	<p><u>Sample 62 (Continued)</u> Cadmium (13.5 mg/kg) Chromium (410 mg/kg) Copper (460 mg/kg) Lead (657 mg/kg) Mercury (3.3 mg/kg) Nickel (84.5 mg/kg) Zinc (1110 mg/kg) 2-butanone (41 ug/kg) Benzo(a)anthracene (810 ug/kg) Benzo(a)pyrene (940 ug/kg) Benzo(b)fluoranthene (1,110 ug/kg) Benzo(g,h,i)perylene (390 ug/kg) Chrysene (1,000 ug/kg) Indeno (1,2,3-cd)pyrene (400 ug/kg) Benzo(k)fluoranthene (900 ug/kg)</p>

** Class II: Chemicals with a strong likelihood of an association with other dioxin compounds.

*** Class III: Chemicals with a moderate probability of dioxin association. Source: Esposito (EPA, 1980)

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C. Conclusion

Publicly available documents establish a CERCLA liability claim against the example industrial generators for conduct occurring before the PVSC was granted its first permit for the outfalls because (1) the industrial generators discharged wastewater effluent to the PVSC sewer in a CSO service area, (2) the industry's wastewater contained hazardous substances, (3) the CSOs discharged to the Passaic River, and (4) hazardous substances like those in the industrial generators' effluent were found in Passaic River sediments proximate to the specific CSO outfall.

Moreover, these publicly available records demonstrate a strong association between the industry's operations and the contaminants in the Six Mile Study Area that form the focus of the current investigation, dioxins, furans, PCBs and metals.

This brief examination of even these few examples illustrates how the bypassing practice affects the liability of industrial dischargers within the PVSC's service area. The publicly available records for these industries are typical of the files available on other industrial waste generators in the PVSC service area. These few examples demonstrate that:

- **EVERY INDUSTRIAL FACILITY WHOSE WASTE CONTAINED HAZARDOUS SUBSTANCES AND WHOSE WASTE HAS BEEN BYPASSED TO THE SIX MILE STUDY AREA IS A PRP. COLLECTIVELY, THESE FACILITIES ARE RESPONSIBLE FOR PCDDS, PCDFS, PCBS, PESTICIDES, METALS AND OTHER HAZARDOUS SUBSTANCES FOUND IN THE SIX MILE STUDY AREA SEDIMENTS.**
- **A *PRIMA FACIE* LIABILITY CASE AGAINST MANY OF THESE PRPS CAN BE ESTABLISHED FROM PUBLIC RECORDS.**

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PART VI WHAT SHOULD EPA DO?

To fulfill the duties imposed by CERCLA, including the duty to identify PRPs created by 42 U.S.C. § 9613(k)(2)(D), EPA should:

- Identify as PRPs every industrial facility whose waste contained hazardous substances and was bypassed to the Six Mile Study Area.
- Collect from all sources all records necessary to determine the nature and volume of materials bypassed to the Six Mile Study Area.
- Evaluate the extent to which ongoing discharges affect current Study Area conditions.

Maxus, on behalf of Occidental Chemical Company, will assist EPA in accomplishing these tasks, and looks forward to working constructively with the Agency.

Industries in the Six Mile Study Area Serviced by the PVSC*

MAP NUMBER	NAME	STREET ADDRESS	SUSPECTED OUTFALL
1	Newark Wire Cloth Company	351 Verona Avenue	Verona Ave
2	M&M Scrap Metals	202 Verona Avenue	Verona Ave
3	Seton Leather Company	345 Oraton Street	Verona Ave
4	Bickoff L Scrap Iron & Metal Co.	199 Oraton	Delavan Ave
5	A&L Dyers	36 Seabury Street	Delavan Ave
6	McGraw-Edison Company	14 Fourth Avenue	Clay Street
7	Manco Metal Finishers	390 Park Avenue	Clay Street
8	Brightboy Abrasives	351-356 6th Avenue	Clay Street
9	Consolidated Laundries	35 High Street	Clay Street
10	Art Metal U.S.A.	300 Passaic Street	Clay Street
11	Butler Industries	637 Central Avenue	Clay Street
12	Hy-Grade Electroplating	35 Fourth Street	Clay Street
13	Wiss & Sons (J.Wiss)	400 West Market Street	Clay Street
14	Plumb Company	73-77 Norfolk Street	Clay Street
15	Westinghouse Electric	90 Orange Street	Clay Street
16	Modern Polishing & Plating	242 South 12th Street	Clay Street
17	Royle Plating Company	70 Sussex Avenue	Clay Street
18	Patti Electroplating	302 South 12th Street	Clay Street
19	Benjamin Moore & Co.	134 Lister Avenue	Newark
20	Thomasset Colors Division	120 Lister Avenue	Newark
21	Hilton-Davis Chemical Co.	120 Lister Avenue	Newark
22	Earthline (SCA Services)	120 Lister Avenue	Newark
23	Triplex Oil Refining Co.	80 Lister Avenue	Newark
24	Fairmount Chemical	117-135 Blanchard Avenue	Newark
25	Sherwin Williams Company	Brown St. & Lister Ave	Newark
26	National Radiator Company	30 Lister Avenue	Newark
27	Atlas Refinery	142 Lockwood Street	Newark
28	Atlantic Refining Company	142 Lockwood Street	Newark
29	Acme Refining Company	12 Lister Avenue	Newark
30	Norpack Corporation	70 Blanchard Street	Newark
31	Standard Tallow Corporation	61 Blanchard Street	Newark
32	Ecodyne, Graver	72 Lockwood Street	Newark
33	Newark Boxboard Company	17 Blanchard Street	Newark
34	Bayonne Barrel & Drum	154 Raymond Boulevard	Newark
35	Newark Tank Wash Inc.	335 Raymond Blvd.	Newark
36	Kenny Press Inc.	110 Edison Place	City Dock
37	Alliance Chemical Company	33 Avenue P	Newark
38	Pfister Chemical (Alliance)	33 Avenue P	Newark
39	Shelton Manufacturing	591 Ferry Street	Newark
40	All Plating & Casting	589 Ferry Street	Newark
41	Dublon Inc.	84 Waydell Street	Newark
42	Ronson Metals Corporation	55 Manufacture Place	Newark
43	A.C. Transformer	89 Madison Street	Jackson Street
44	Tidewater Baling Corp.	26 St. Charles	Polk Street
45a	Moyer Plating Company	175 Christie Street	Freeman St.
45b	Shiman Industries Inc.	109 Monroe Street	Jackson Street
46	Victory Optical Manufacturing	9 Mulberry Place	City Dock
47	Sun Chemical Corporation	185 Foundry Street	Newark

* This is a partial list of industries identified to date. Industry locations are shown on the map included as Figure 1.

Industries in the Six Mile Study Area Serviced by the PVSC*

MAP NUMBER	NAME	STREET ADDRESS	SUSPECTED OUTFALL
48	Hummel Lanolin Corporation	185 Foundry Street	Newark
49	Ramco	185 Foundry	Newark
50	Automatic Plating	185 Foundry Street	Newark
51	Arkansas Company	185 Foundry Street	Newark
52	Pitt-Consol Chemical Co.	191 Doremus Avenue	Newark
53	Ashland Chemical Company	221 Foundry Street	Newark
54	Krementz & Company	49 Chestnut Street	City Dock
55	Cook & Dunn Paints	109 St. Francis Street	Newark
56	Federated Metals Corp.	150 St. Charles Street	Newark
57	American Smelting & Refining	150 St. Charles	Newark
58	Nimco Shredding Company	252 Doremus Avenue	Newark
59	Laurel Lamp Company	Rome & Magazine St.	Newark
60	Elan Chemical Company	268 Doremus Avenue	Newark
61	River Smelting & Refining	387 Avenue P	Newark
62	(Revere)	387 Avenue P	Newark
63	Federated Pacific Electric Co.	150 Avenue L & Herbert	Newark
64	Industrial Hard Chromium Co.	7 Rome Street	Polk Street
65	Celanese Chemical Company	375 Doremus Street	Newark
66	Black Oxide Processing Corp.	85 Gothard Street	Newark
67	Celanese Chemical Company	354 Doremus Street	Newark
68	Express Container Corp.	105 Avenue L	Newark
69	Ashland Oil	400 Doremus Avenue	Newark
70	Albert Steel Drum	338 Wilson Avenue	Newark
71	Globe Metals Inc.	338 Wilson Avenue	Newark
72	Prentiss Drug & Chemical	338 Wilson	Newark
73	Scientific Chemical Processing	411 Wilson Street	Newark
74	Sepenuk J & Sons	21 Hyatt Street	Newark
75	Calumet Sales Company	23 Hyatt Avenue	Newark
76	Englehard Industries	429 Delancey Street	Newark
77	Hudson Smelting & Refining	567 Wilson Avenue	Newark
78	PVSC	600 Wilson Avenue	Newark
79	Darling Delaware Company	825 Wilson Avenue	PVSC
80	Tenneco Oil Company	678 Doremus Avenue	Newark
81	Kearny Scrap Metal	478 Schuyler Avenue	Ivy Street
82	Matonis Scrap Metal Co.	45 John Hay Avenue	Ivy Street
83	Tri-City Services	48 3rd Street	Ivy Street
84	Hanovia Liquid Gold	1 West Central Avenue	Central Ave
85	Rover F & Son	516 Central Avenue	Worthington Ave
86	Drew Chemical	1106 Harrison Avenue	Worthington
87	Kearny Smeltery & Refinery	936 Harrison Avenue	Worthington
88	Marvel Photo Company	111 South 4th Street	Harrison Ave
89	Osbourne & Co. (C.S. Osbourne)	125 Jersey Street	Bergen Street
90	Worthington Pump Corporation	401 Worthington Avenue	Worthington
91	Eagle Affiliates	505 Manor Avenue	Worthington
92	Harrison Steel & Metal Co.	308 1st Street	Bergen Street
93	Driver Harris Company	201 Middlesex Street	Middlesex Street
94	RCA	415 South Fifth Street	Bergen Ave

* This is a partial list of industries identified to date. Industry locations are shown on the map included as Figure 1.

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